

# Preparing Ecommerce Website to Handle High Traffic on Sale Events

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## ABSTRACT

It is mandatory for every business to have website to be successful. Selling on ecommerce websites has been there for long but the task to keep it running to meet expectations of business and traffic is always a challenging task. Every day in e-commerce is learning day for most of the IT support teams. Some days are expected to have more sales and it greatly benefits the business if the IT systems are able to take the load of traffic and convert the visitors to sales. In this article we will describe the various ways IT teams can prepare for such days of anticipated high website traffic.

**KEYWORDS:** *ecommerce, website, design patterns, peak season, thresholds, high availability*

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## I. INTRODUCTION

It is mandatory for every business to have website to be successful. Selling on ecommerce websites has been there for long but the task to keep it running to meet expectations of business and traffic is always a challenging task. Every day in e-commerce is learning day for most of the IT support teams. Some days are expected to have more sales and it greatly benefits the business if the IT systems are able to take the load of traffic and convert the visitors to sales. Those anticipated days can be either a planned flash sale for a day or as big as the holiday peak season. There is nothing more disheartening for business when they have inventory to sell online, users want to buy online but the IT systems are down. In this article we will describe the various ways IT teams can prepare for such days of anticipated high website traffic.

## II. Announcement and Types of Events

Earlier the notification, better the teams can prepare the systems. But that is not practically possible as business might have some sudden requests or plans. Also, in spite of knowing well in advance of the holiday season every year, many websites are unable to handle the load. Type of expected high load days are as below:

➤ Impromptu sales - Business might plan for flash sales and discounts to improve sales or adjust their inventory. It might be also be triggered by competitor's sale events. These are the most challenging in terms of schedule of IT resources. IT support teams have to pause their current tasks on hand and change priority to the sale event. It becomes even more difficult if there is another

major unresolved issue at same time or planned maintenance activities at same time.

- Event based Sales - These types of sales are based on certain events happening and outcome of them. For example, based on the result of sports event the sale items on the website have to be launched with appropriate winner merchandise. These events need accelerated content, inventory updates and refresh on website. Team is expected to react fast based on the outcome of event. It is also often related to brand prestige if one website is able to refresh the homepage and sell content of sports event winners sooner than other.
- Calendar Events - These events are fixed days throughout out the year and often tagged as seasonal. For example: valentine day, father's day, back to school etc. These can be planned ahead and easy to handle if orchestrated properly. These calendar event sales often give a measure of the expected sales and traffic in peak season, like the traffic in peak season can be three times the traffic on back-to-school sales etc.
- Holiday Sales / Peak Season - These are special type of calendar event days. These started long back as retailers giving huge discounts to their shoppers for as means of thanking for the sales until then in the year. These sales starting from thanksgiving are termed as peak season or holiday season sales. They generally start around Thanksgiving Day and end around Christmas. These

types of sales mostly started in USA but are now seen in almost around the globe in one format or other. In recent years, these sales have been starting more early like start of November itself. Most retailers make more sales and revenue on these days than rest of the year combined.

### III. Meet and Plan

Irrespective of upcoming events or not, regular meetings between IT and business helps IT teams to be aware of such upcoming events and business expectations. It also helps business to know the calendar of any maintenance or IT changes upcoming. Both the parties can plan around the dates if there is the conflict. It also provides opportunity to evaluate features on website which might not be performing well or missing as per business needs.

Plan and Synchronize –Refer Figure 1. Once a sales event is known to be upcoming, planning for it with all stakeholder in a common meeting helps every team to adjust their priorities. Forgetting to inform certain stakeholder can cause major roadblocks during sales event. Thus, it always helps to keep the list of teams handy and meet regularly like every

week even if there are no events, so that each team is aware of each other's changes and schedule and can synch up their activities for the big day. Main stakeholders being Application Team, Business, Infrastructure and Service Desk. Depending on the software products used, third party systems like payment systems, tax systems are critical part of sale flow and should be included in communication. Preparing a checklist of actions for each team and meeting again to assess the readiness couple days before the event is often very productive. Knowing how much time each IT system needs to push changes to next system or to website is great metric to be aware of. For example: If product information is entered in retail systems (Ex: oracle retail /SAP etc) by business, it might take a day or hours for that product to make on the website depending on the systems process like data enrichment, approval etc. Every company has it's approximate processing time. Inventory once entered or updated in source system, after how much time will it show on site based on flow from intermediate systems. Focusing on flow surrounding content for pages, product information, pricing and inventory leads to beneficial results.

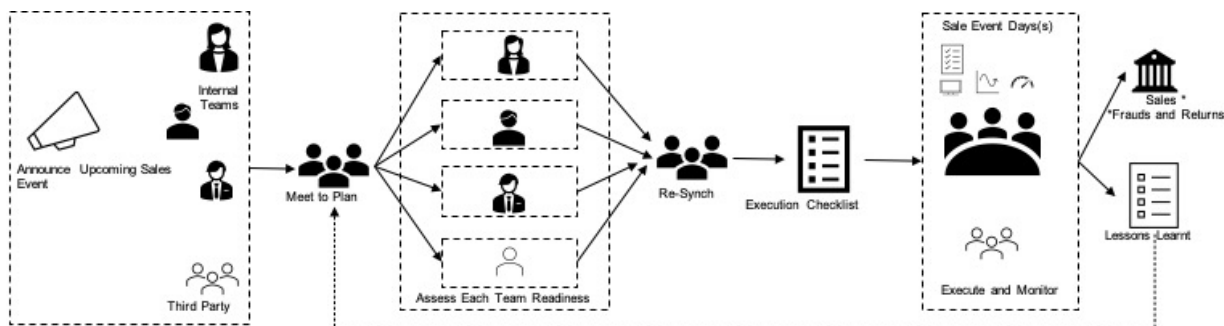


Figure 1 Preparing for Sales Events

### IV. Assess and Prepare

While business works in backend like preparing the merchandise and pricing, rest of the teams needs to do work in parallel to assess their systems readiness to handle the sales event.

- **Baseline, Alerts and Monitor:** Baseline the existing systems is critical part of the process if not done earlier. Every system is expected to know the metrics on normal operations day and how much more can it take without modifications i.e. threshold levels. If the expected traffic would cause thresholds to breach, then it is important to reassess and improve the infrastructure at earliest. For example, in figure 2 for sample application, it can handle sale event 1 at 85% memory utilization, little above P2 alert threshold of 80% but within P1 threshold. But it cannot handle sale event2 with current infrastructure. Depending on the type of infrastructure, boosting up the capacity can take weeks (physical servers) or just minutes (cloud). Once thresholds and expected deviation are calculated, often the alerts have to be readjusted to have effecting monitoring and alerts. For example, on normal day having queue depth more than 100 might be triggering an alert, but for the sale day it might be normal to have 200 depth in queue and alerting has to be adjusted accordingly.

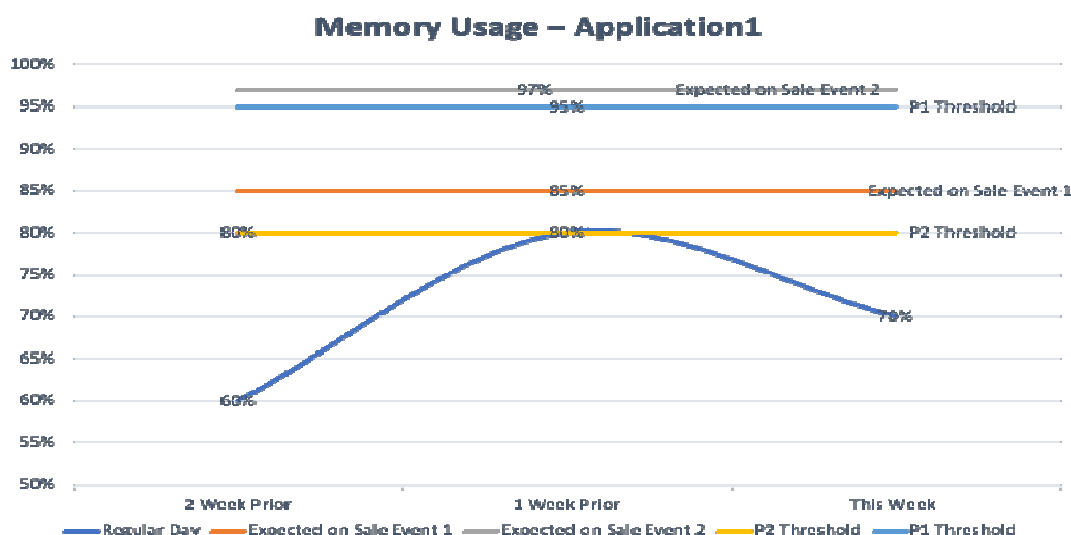


Figure 2 threshold and Forecasted Levels

- **Design Patterns to recover** - Code quality and system stability is continuous process throughout the year and sale events would be an opportunity to reassess the performance. Applying appropriate architecture design patterns are great way to build robust systems. Circuit Breaker and Feature Flag patterns are great design patterns to be considered while architecting high availability website functionalities and flow. Circuit Breaker is pattern is to solve the problem statement that once an error in a running software then it will continue to reoccur until it is fixed and can bring down the entire system. If circuit break is implemented, it ensures the systems detects error and ensure the corresponding flow is disabled or routed to alternate flow automatically to avoid reoccurrence of the error until it is fixed. Flag pattern is design pattern in which flags are used to control flow or feature. This feature is normally used to test features on website, but they can be used during high traffic days to disable non-critical flows. For example: often use flags to run feature like cart popup, marketing Flags should be tested to ensure they work as needed. If not implemented properly feature flags would need server restarts which can eventually bring down the system under heavy load and cause more harm.

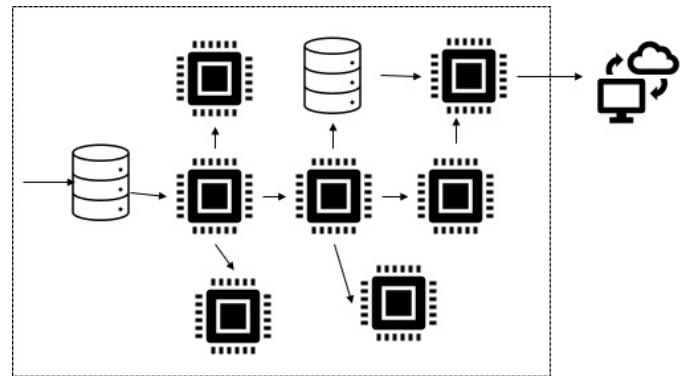


Figure 3 Regular Day (all flows enabled)

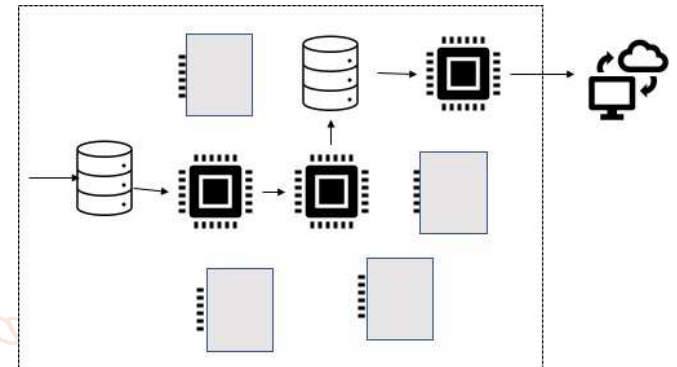


Figure 4 High Traffic Day (only critical flow)

- **Caching** - Caching keeps the load off the core infrastructure and also renders content to user several times faster. It is lifesaver for all the websites experiencing high traffic. There are caching at all levels of user flow, from api to content delivery systems to browser. During sales days, some pages are visited more than others. Caching is often tradeoff between staleness of page and performance. Careful calculation should be done to ensure balance between acceptable staleness of page and ability of system to take new requests. Avoiding cache clears during middle of the day, helps keep the system stable. System restarts and cache clearing should be planned during off hours when expected traffic is negligible. If business can share the urls of website pages planned to be used for sales most, IT term can validate those urls are included in the caching url patterns and get the required caching and also show up as landing pages for any keyword searching.
- **Non-Essential Jobs and Logs** -On normal day there are could tens to hundreds of scheduled jobs in each subsystem, pushing or pulling data in between systems. These jobs do occupy network bandwidth and also system compute and storage. (Refer- Figure 3 and 4). Disabling the non-essential jobs helps to free up the bandwidths for essential data flow. Common examples of such jobs are differential backup services etc. There are few jobs, changing of which would need business approval like product extract to marketing systems.
- **Essential Jobs** -Even the essential jobs like flow of product data, pricing and inventory run multiples on a day. On regular day they might be setup to run throughout the day. Keeping the flow of product data and pricing only once per day reduces the impact of bandwidth on integrations and necessity of cache clears also. Inventory should be the key data flow enabled throughout the day to ensure the accurate status of availability of the product on website.
- **Contact List** - If there is helpdesk team, that team is normally responsible for coordinating the IT issues and incidents and maintain the contact list of all internal teams and external dependent vendors. If there is not service desk team, this is be owned by application support teams. In event of issue, time is of essence as every minute of downtime is loss of revenue. Thus, effective documentation of all required parties contact methods and SLAs is highly beneficial.
- **People Roster** -Even though systems run on their own, constant monitoring and human intervention and cross-team synchronization is needed for any successful IT systems. Most IT support team maintain daily support roster through the year. For the sales days, synchronizing the roster between teams, placing all teams in common accessible path and including executives in roster for escalation helps to coordinate issues on critical days better.
- **Change Freeze** - Lesser the changes to system, better the stability of systems. But how many days ahead of the sales event should the code freeze be put in place depends on how big the sales event is and also the maturity of the system and know issues in system.
- **Disaster Recovery** - All systems now have Disaster Recovery plans and systems. But they are not often tested and found to be not working as expected when there is a real disaster. Testing the Disaster Recovery process by intentional chaos or shutdown would help evaluate the systems, infrastructure, people readiness and mainly organizational objectives of RTO (Recovery Time Objective) and RPO (Recovery Point Objective). RTO translates to how much downtime is acceptable. RPO roughly translates to how much of chronological data loss is acceptable.
- **Execute** - On the day or during multi-day event, it is common practice among retailers to have war room style meetings to have all teams in same room to

monitor, analyze issues in person with cross teams and quickly act on issues. Multiple television screens with health dashboards from all systems is key to catch negative trends or issues early. Business can demand changes to product or pricing based on sales or competitors, IT would be executing on such requests. If all goes well, it would be just days of counting orders, sales and running IT jobs as per the adjusted schedule.

## V. Post Execution

Sales event can result in scenarios of i) Did not get expected users to site ii) Got the expected website visitors but IT systems could not handle it iii) Got expected users and sales with no downtime or inventory issues. The third scenario being the most desired and fruitful for all. Along with sales, most retailers also see increase of credit fraud and returns. Irrespective of outcome the best thing business and IT can take away are the lessons learnt. Noting down the lessons learnt from sales events are key input to prepare and access for the next sales event. Both, what went well and what did not should be captured as soon as possible before the exhausted teams sign off the event.

## VI. Conclusion

No matter how many days or how well the preparation is, websites will fail. Technologies like micro services and auto scaling in cloud have taken most of the guess work of infrastructure sizing, but there would be surprises in one way or the other. Big retailers like Best Buy, Macy, Target, JCPenneyetc., all had their downtime one day or other. How quickly and gracefully they recover from that downtime, learn the lessons and implement solutions based on those lessons is what is differentiating them more and more.

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